REMARKS

Applicant has amended claims 1, 2, 3, 4, 5, 6 and 8 and added new claims 10-13. Applicant respectfully submits that the amendments to the claims are supported by the application as originally filed and do not contain any new matter. Accordingly, the Office Action will be discussed in terms of the claims as amended.

The Examiner has rejected claims 1-9 under 35 USC 112, second paragraph, as being indefinite. In view of the amendments to the claims, Applicant respectfully submits that claims 1-9 comply with 35 USC 112, second paragraph.

Before discussing the art rejections, Applicant would like to first point out a conventional piezo-oscillator, the problems with the conventional piezo-oscillator and how Applicant's invention overcomes the problems of the conventional piezo-oscillator.

In the conventional piezo-oscillator, as shown in Figure 5(b), the constant-current circuit 105 is provided so that the piezo-vibrator 102 constantly vibrates at a predetermined frequency. By way of controlling the voltage supplied by the power source voltage Vcc with the constant-current circuit 105, the piezo-vibrator is supplied with a predetermined voltage and thus vibrates in a stable fashion.

It is well known that the oscillation frequency of piezo-vibrators depends on a drive level. By way of examining changes in the oscillation frequency, that is a so-called drive level dependency (DLD) and correspondence to changes in the drive level of piezo-vibrators, it becomes possible to secure the stability of frequency and characteristics and reproducibility of piezo-vibrators.

However, once a piezo-vibrator is incorporated in a piezo-oscillator as seen in prior art, it becomes impossible to examine the oscillation frequency by way of changing the drive level because the oscillation circuit is structured so that a predetermined voltage is constantly applied to the piezo-vibrator.

In view of the above, the present invention is made based upon a problem that in a piezo-oscillator seen in the prior art the drive level is controlled so as to be at a predetermined level constantly and therefore it is not possible to change the drive level with respect to the piezo-vibrator. More specifically, in Applicant's invention, as seen from Figure 1 or 2, a switch circuit 4 is provided in a piezo-oscillator; and when the power source voltage exceeds a predetermined value, the control circuit 6 functions so that the switch circuit 4 selects the power source Vcc

side, thus invalidating the constant-voltage circuit 3; also, a resistor R5 is provided parallel to the constant-current circuit 8 and a switch circuit 5 is further provided, so that when the power source voltage exceeds a predetermined value, the control circuit 6 functions so that the switch circuit 6 selects the resistor R5 side, thus invalidating the constant-current circuit 8. With this structure, the drive level of the oscillating circuit can be changed, thus making it possible to measure the DLD characteristics of the piezo-vibrator Y1.

With the above in mind, Applicant has carefully reviewed the rejections based upon the art and the Examiner has rejected claims 1, 3, 5 and 7 under 35 USC 102 as being anticipated by Kato, stating that Kato in Fig. 1 shows a piezo-oscillator circuit comprising an oscillator circuit 2 and an amplifier circuit 1 and a constant-voltage circuit in which a power source Vcc and said oscillator circuit 2 are connected to said constant-voltage circuit to supply a constant voltage to said oscillator circuit 2.

In reply thereto, Applicant has carefully reviewed Kato and respectfully submits that Kato relates to a temperature compensation type piezoelectric oscillator. The invention of Kato was made in view of the problem that since the conventional oscillation frequency temperature compensation circuit is connected to a power source Vcc via a three-terminal regulator (a constant-voltage circuit) so as to maintain the input and output voltage, the oscillator takes up a large space, thus hindering its down sizing and cost reduction.

In other words, Kato denies the necessity to use three-terminal regulator and makes the buffer amplification output circuit assume a direct current constant voltage output function of the three-terminal regulator, thus providing a temperature compensation type piezoelectric oscillator with the downsizing and low cost being realized therein.

As the Examiner pointed out, Fig. 1 of Kato shows the piezo-oscillating circuit 2 and the buffer amplification output circuit 1. So as to provide a predetermined voltage to the piezoelectric oscillating circuit 2, the power source Vcc and the piezoelectric oscillating circuit 2 are connected to each other with the buffer amplification output circuit 1 in between. However, this circuit structure is substantially the same as a common piezoelectric oscillator that is shown as prior art in Figure 5(b) of Applicant's application. In such a circuit structure, the drive level of the piezoelectric vibrator incorporated in a piezoelectric oscillator cannot be changed.

To the contrary, in Applicant's invention, as seen from Fig. 1, the amplifier circuit 2 and the constant-voltage circuit 3 are connected with the switch circuit 4 in between. With this

structure, when the voltage supplied from the power source Vcc is higher than a predetermined value, the control circuit 6 controls the switch circuit 4, thus connecting the amplifier circuit 2 and the power source Vcc, invalidating the constant-voltage circuit 3 so that the power source Vcc is directly inputted in the oscillating circuit, and making it possible to change the drive level with respect to the piezo-vibrator Y1. Furthermore, the power source line 7 and the constant-current circuit 8 are connected with the switch circuit 5 in between, the constant-current circuit 8 is provided parallel to the resistor R5. With this structure, when the voltage supplied from the power source Vcc is higher than the predetermined value, the control circuit 6 controls the switch circuit 5, thus connecting power source line 7 and the resistor R5, invalidating the constant-current circuit 8, thus making it possible to change the drive level with respect to the piezo-vibrator Y1. There is no disclosure or suggestion in Kato about this feature of Applicant's invention. Also, there is no disclosure or suggestion in Kato about issues or an acknowledgement of issues on how such two matters be balanced after incorporating the piezo-vibrator Y1 in the piezo-oscillator, when one matter is to drive the piezo-vibrator Y1 by changing the drive level and another is to obtain a stable oscillation at a predetermined voltage during normal run time.

Accordingly, Kato does not provide such a function or effect of Applicant's invention that the drive level is changed with respect to the piezo-vibrator incorporated in the piezo-oscillator, thus allowing the piezo-vibrator to vibrate and making it possible to examine the DLD characteristic of the piezo-vibrator.

In view of the above, therefore, Applicant respectfully submits that Kato does not show each and every element of Applicant's invention and claims 1, 3, 5 and 7 are not anticipated thereby.

The Examiner has rejected claim 2 under 35 USC 102 as being anticipated by Gray, stating that Gray shows in Fig. 2 a piezoelectric oscillator comprising a piezo-oscillator including a piezo-vibrator 2, an amplifier circuit 31, a constant-current circuit 21, 22 and a power source 14.

In reply to this rejection, Applicant has carefully reviewed Gray and respectfully submits that Gray relates to a crystal-controlled oscillator that functions at a series resonant frequency; and it is an object of Gray, in order to maintain the precise phase shift through the amplifier for any practical value of the supply voltage, to provide a highly stable oscillator by way of

connecting an amplifier circuit that provides (DC) feed-back voltage and a crystal vibrator. Furthermore, it is Gray's another object to provide a highly stable oscillator for electronic timepieces that employ an inexpensive crystal with high precision and low voltage and current input.

As the Examiner pointed out Gray shows in Fig. 2 a piezo-oscillator that comprises a piezo-oscillator including a piezo-vibrator 2, an amplifier circuit 31 and a constant-current circuit 21 and 22. This, however, means that Gray only describes how to let the piezo-vibrator oscillate at a predetermined frequency in a stable fashion; and the oscillator of Gray merely corresponds to the piezo-oscillator shown in Fig. 5(b) of Applicant's application, and it cannot change the drive level with respect to the piezo-vibrator incorporated in the piezo-oscillator.

To the contrary, in Applicant's invention, the power source line 7 and the constant-current circuit 8 are connected with the switch circuit 5 in between, and the constant-current circuit 8 is connected parallel to the resistor R5; and when the voltage supplied from the power source Vcc is higher than a predetermined value, the control circuit 6 controls the switch circuit 5 so that the power source line 7 and the resistor R5 are connected thus invalidating the constant-current circuit 8, and changing the drive level with respect to the piezo-vibrator Y1. Gray does not disclose or suggest this feature of Applicant's invention. Also, there is no disclosure or suggestion in Gray about issues or an acknowledgement of issues on how such two matters can be balanced after incorporating the piezo-vibrator Y1 in the piezo-oscillator, when one matter is to drive the piezo-vibrator Y1 by changing the drive level and another is to obtain a stable oscillation at a predetermined voltage during normal run time.

Accordingly, Gray does not provide such a function or effect of Applicant's invention that the drive level is changed with respect to the piezo-vibrator incorporated in the piezo-oscillator, thus allowing the piezo-vibrator to vibrate and making it possible to examine the DLD characteristic of the piezo-vibrator.

In view of the above, therefore, Applicant respectfully submits that Gray does not show each and every element of Applicant's invention. Therefore, Applicant respectfully submits that claim 2 is not anticipated by Gray.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

In view of the above, therefore, it is respectfully requested that this Amendment be entered, favorably considered and the case passed to issue.

Please charge any additional costs incurred by or in order to implement this Amendment or required by any requests for extensions of time to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.

Respectfully submitted,

KODA & ANDROLIA

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